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GROUNDWATER QUALITY ANALYSIS OF ASNOLI VILLAGE OF AMBARNATH, MAHARASHTRA, INDIA

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ABSTRACT

Asnoli village of Ambarnath area was selected for study purpose. The groundwater quality of Asnoli village was studied from March 2012 to June 2012. Groundwater samples were collected from 4 sampling sites during the study period and analyzed for different physicochemical parameters like Temperature, pH, Electrical Conductivity, Total Hardness, Turbidity, and Chloride. Obtained results were compared with WHO and BIS standards. Except for turbidity, all parameters were found within the permissible limits given by BIS and WHO. Turbidity in groundwater samples indicates contamination of water by outside sources.

KEYWORD: Contamination, Groundwater, Physicochemical, Permissible limits.

INTRODUCTION

All over the world groundwater plays a very important role in the day-to-day life of man. People are using groundwater for several purposes. Its physical and chemical properties make it a reliable source throughout the world. Groundwater plays a variety of roles in day today's life, which makes it an important resource for human beings.

The water-use pattern varies widely in different parts of the world. It is dominantly used for irrigation in Asia, Africa, and South America. In Europe and North America, it is principally used to meet domestic demands. Over half of the world's population relies on groundwater

for drinking water supplies. It is also an important supplemental source for irrigation. In India, nearly 92% of the annual withdrawal is for irrigation. (Das,2011)

Groundwater contamination results from a sequence of anthropogenic and natural activities and processes involving a contaminant source, its mobilization through the soil (transport action), and its ultimate fate (sinks). Sources of contamination include human activities performed primarily on the surface that releases toxic substances into the environment (Rogers *et.al*., 2007).

Asnoli Group Grampanchayat is a group of rural settlements under the Ambarnath block of Thane district in the state of Maharashtra. This village is 15 km. away from Badlapur railway station of central railway. This Group Grampanchayat is consists of a group of five settlements namely: Asnoli, Pimploli, Yeve, Pimploli Vadi, and Barvi dam colony, having a population of about 3000 according to a census of 2011, as reported by Gramsevak and Sarpanch of the village. (Chavan et.al.2011; Nirbhavane, 2016)

Groundwater is an important source of water supply in a rural area; as it is used for different purposes in day-to-day life. (Chavan et.al.2011) Therefore an attempt has been made to find out the groundwater quality of Asnoli village.

Maintenance of open well is a serious concern in today's time as in village-like Asnoli, where people are getting drinking water from other sources, in such cases, an important source of groundwater i.e., open well is completely ignored by villagers & not maintained on regular basis, which further facing continuous pollution problem, and not gets detected immediately.

METHODOLOGY

4 groundwater samples were collected from selected areas of Asnoli Group Grampanchayat from November 2011 to February 2012.

Table 1: Sampling Sites.

Sampling Site	Station No.
Pimploli Wadi Open well	S1
Yewa Open well	S2
Pimploli village Open Well	S3
Pimploli Bore Well	S4

Samples were collected in 2 lit. the capacity of clean polythene bottles. The bottles were rinsed with the groundwater to be taken for analysis. Tightly sealed after collection and labeled in the field area. Collected samples were analyzed for the following parameters Temperature, pH, Electrical Conductivity, Total Hardness, Turbidity, and Chloride.

The temperatures, pH of the water samples were determined on the spot using a Thermometer and Portable pH meter respectively. Conductivity measured by Conductivity meter. Total hardness was measured by EDTA titrimetric method using the EBT indicator. Turbidity measured by Turbidometer. Chloride contents by Argentometric method using potassium chromate as an indicator (APHA,2005; Trivedi, 1986).

The quality of groundwater has been assessed by comparing each parameter with the standard desirable limits prescribed by BIS and WHO.

RESULTS AND DISCUSSION

After analysis obtained results are shown in table no.2 and further it was compared with the BIS and WHO standards from table no.3.

Table 2: Mean value of a parameter for the summer season (March 2012- June 2012).

Station No.	Temp. (^{0}C)	pH	E.C. (µS/cm)	Total Hardness (mg/l)	Turbidity (NTU)	Chloride (mg/l)
S1	29	6.5	208.4	234	10.4	712.3
S2	29	6.3	196.2	226	8.8	656.8
S3	28	6.6	208.6	218	10.8	718.2
S4	29	6.7	114.6	208	8	364.4

Table 3: Drinking water standards.

Sr. No.	Parameters	BIS (IS 10500-91)		WHO
		Desirable Limit	Max. permissible Limits in the absence of alternate source	
1	Temperature (^{0}C)	-	-	-
2	pH	6.5 to8.5	No relaxation	6.5 – 8.5
3	Electrical Conductivity (µS/cm)	-	300	-
4	Total hardness as $CaCO_3$(mg/l)	200	600	500
5	Turbidity(NTU)	-	5	5
6	Chloride in (mg/l)	250	1000	250

Temperature-Temperature ranges from 28^{0}C to 29^{0}C during the study period. The highest temperature was observed at the station no.S1, S2 & S4, and the lowest temperature was

found at S3. The temperature of the water changes seasonally with air temperature. (Carr,2006).

pH- pH ranges from 6.3 to 6.7 during the study period. All the samples were found within the desirable limit given by BIS and WHO. At station no.S4 highest pH was observed and at the station no.S2 lowest pH was observed. All the samples were found within the desirable limit given by BIS and WHO. In general, the lower the value of pH, the higher is the level of corrosion. An increase in the amount of organic carbon, total carbonate by the use of sewage leads to a decrease in pH level. It is positively correlated with Electrical Conductance and Total Alkalinity. (Gupta,2009)

Conductance-Conductance was ranged from 114.6 to 208.6 µS/cm. The highest conductance was observed at the station no. S3 and lowest conductance was observed at the station no. S4. The major reason for the difference in Electrical Conductivity is anthropogenic activities prevailing in this region and the lithological composition of the area. It was observed that Electrical Conductivity values increase in some samples with the increasing amount of Sulphate, Chloride, Bicarbonate, and Hardness as $CaCO_3$ **(**Ramesh *et.al.*,2012). All samples were found within the permissible limits given by BIS.

Total Hardness- Total hardness ranges from 218 to234 mg/l during the study period. At station no. S1, the highest hardness observed in the study period. S1 was found above the desirable limit given by BIS,i.e.200mg/l, but all the samples were found within the permissible limit given by BIS and WHO i.e.600 and 500 respectively. The Hardness of water varies from place to place and it reflects the nature of the geological properties of the area, with which water has been in contact. Total Hardness includes both temporary and permanent hardness caused by the Calcium and Magnesium, based on which water is categorized as soft or hard and very hard. (Sengupta, 2013; Ramya *et.al.*, 2015).

Turbidity- Turbidity in the study area ranges from 8 to 10.8 NTU. All samples were found above the permissible limit given by BIS and WHO i.e.,5 NTU. Open wells are, open in the atmosphere, so having more chances of contamination. Borewell shows less turbidity compared to open well, as it gets less affected by outside disturbances.

The highest turbidity was observed at station no. S3 Open well water shows more turbidity compared to bore well water. The Turbidity has a negative impact on the user's acceptability

of water as cloudiness is visible in the water. It is not a health risk but it is a sign of the possible occurrence of contaminants. When such water is not treated appropriately before use, it has a health concern. (Who,2011).

Chloride- Chloride in the study area ranges from 364.4to 718.2 mg/l., highest chloride was observed at station no.S3. Chloride is found in the groundwater due to minerals like apatite, mica, hornblende, and also from the liquid inclusions of igneous rocks. **(**Das *et.al.*,1988; Prakash *et.al*.,2006) All the samples were found above the desirable limit given by BIS and WHO i.e. 200 mg/l, but all samples were found within the permissible limit given by BIS i.e.1000 mg/l.

CONCLUSION

All groundwater samples collected from Asnoli village were found within the permissible limit given by BIS and WHO for the different parameters, except the turbidity. Turbidity was found above the permissible limit given by BIS and WHO. All the 04 open wells were not maintained by local people for many days, as nowadays they are not dependent on groundwater for drinking purposes.

The probable reason behind turbidity of water is lack of maintenance around open well, which causes mixing of soil and silt/dust particles in open-well areas. Turbidity is an indication of contamination of groundwater up to a certain extent. Other parameters were found within the permissible limit, therefore well water possible to use for different purposes except drinking. Use of alum to remove turbidity is necessary as well as before use filtration is also necessary while using this water for any purpose.

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